CITY OF LONG BEACH
Gas & Oil
DEPARTMENT

G-228S
SPECIFICATION FOR INSTALLATION OF STEEL GAS MAIN

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G-228S SPECIFICATION FOR INSTALLATION OF STEEL GAS MAIN

MATERIALS:

Pipe:

The contractor shall furnish steel pipe in accordance with the following:

NOMINAL SIZE (Inches)	SCHEDULE	OUTSIDE DIAMETER (Inches)	AVERAGE WALL THICKNESS (Inches)	APPROX. UNIT WEIGHT (Lbs. Per ft)	APPROX. LENGTH OF JOINTS (Feet)
.75	40	1.050	0.113	1.131	21
1	40	1.315	0.133	1.679	21
1.25	40	1.900	0.140	2.273	21
2	40	2.375	0.154	3.653	21
4	40	4.50	0.237	10.79	21
6	40	6.625	0.280	18.98	21
8	40	8.625	0.322	28.56	21
12	40	12.75	0.375	49.60	21
16	30	16.00	0.375	62.60	21

All pipe to be furnished shall be new and unused, of domestic manufacture, straight and free from all defects, with ends beveled for welding, in lengths as specified herein. The pipe shall be manufactured, tested and marked in strict conformance with the requirements of one of the following pipe specifications:

API Std 5L, Grade B. . . . . Line Pipe
ASTM A-53, Grade B, Type E or Type S. . . . . Welded or seamless steel pipe

Pipe markings shall also comply with the limitations prescribed in U.S. Department of Transportation Pipeline Safety Standards, Part 192, Title 49 - Transportation of Natural and other Gas by Pipe Line, Paragraph 192.63. Two copies of the Inspection Certificate or Test Report certifying compliance with the appropriate Specification shall be furnished for each pipe size and heat or lot number. These documents shall be delivered to Long Beach Gas and Oil Department, Engineering Division, 2400 E. Spring Street, Long Beach, CA 90806 or inspector on site prior to usage.

Pipe Wrap:

The Contactor shall furnish and install steel pipe wrapped in accordance with the following coating systems:

NOMINAL SIZE (Inches)	*MANUFACTURER*	*PRODUCT*
¾"	Polyken	930-35 mil
1"	Polyken	930-35 mil
2"	Polyken	YG-III 50 mil
4"	Polyken	YG-III 50 mil
6" or larger	Polyken	YG-III 50 mil
4" to 18"	Bredero Price	Pritec
¾" – 18"	PLEXCO	Extruded Polyolefin

Color for all wrapping shall be yellow.

Alternative Manufacturers/systems may be accepted with written approval by LBE 30 days prior to installation.

Coating Materials:

POLYKEN Systems:

System Components

Component	#930	YG-III
Primer layer		
Primer	#1027	#1019
Percent Solids	30%	20%
Inner Layer		
Tensile	30lbs/in	25lbs/in
Elongation	150%	300%

System Properties

Thickness	35mils	80 mils
Volume Resistively ASTM E 257	2.5X10 16th	1.0 X10 16th

Pritec Polyethylene System:

System Properties

Component	Butyl Adhesive	Polyolfin
Thickness (Min)	10 mils	40 mils
Temp at application	280°F to 340°F	450°F to 575°F

Physical Properties of Top Coat:

Property	Test Method	Requirement
Tensile Strength (Break)	D 638	3000
Ultimate Elongation, %	D 638	500
Density at 73°	D 1505	.939
Melting Point		248°F
Color		YELLOW

Extruded POLYOLEFIN Systems:

Adhesive Undercoating - The adhesive shall consist essentially of a blend of rubber, asphalt, and high molecular weight resins, which shall be permanently tacky and adhere to both the steel pipe and the plastic sheath. The adhesive undercoating shall have the properties specified in the following table:

Physical Properties of Adhesive Undercoating:

Property	Test Method	Requirement
Softening Point,°F	ASTM E 28	140 to 170
Penetration, mm, 77°	ASTM D 5	7 to 10
Stormer Viscosity, secs for 100 rev	ASTM D 562	
@ 270°F		120 to 180
@ 300°F		60 to 80
Specific Gravity, 77°F	ASTM D 71	1.08 to 1.20
Sieve Analysis, % fines	ASTM D313	100
Adhesion-Cohesion	Republic Steel	Min. 60 lb.

Application of Adhesive - Immediately following the cleaning process, the adhesive undercoating shall be applied to the pipe at a temperature of 285-310°F, to a minimum thickness of 10 mils.

Plastic Sheath - The sheath material shall be prime virgin, high-density copolymer resin, the properties of which shall be in accordance with the following table:

Properties of Polyethylene:

Property	Test Method	Requirement
Density (pigmented) g/cm^3	ASTM D 1505	Min. 0.957
Flow Rate, g/10 min.	ASTM D 1238	Max. 0.75
Yellow Pigment Content, % by wt.		Min. 2.0

Application Of Plastic Coatings:

Initial Surface Preparation - The exterior surface of the pipe to be coated shall be abrasive steel shot or grit blast cleaned in accordance with Steel Structures Painting Council Surface Preparation No. 6, Commercial Blast Cleaned, SSPC-SP-6. Upon completion of the cleaning process, the pipe surface shall be dry.

Application of Plastic Sheath - The plastic sheath shall be extruded over the adhesive undercoating to provide a smooth sheath that is free of pinholes, bubbles, blisters, wrinkles, cracks, or mechanical voids.

CUTBACK - The coating shall extend to within six inches of each end of the pipe.

TESTING - When the wrapped pipe has cooled sufficiently, the wrapping shall be thoroughly inspected with an approved spark gap holiday detector (8,000 volts minimum). The Contractor shall furnish the holiday detector and the labor to operate same.

Defective Coating:

All defects disclosed by the holiday detector, and any defects that occur as a result of mechanical damage to the coated surface, shall be repaired by the Contractor at no expense to Long Beach Gas and Oil Department (LBGO). Patching will not be allowed. The coating shall be completely removed from the full length of the pipe and the length shall be recoated. The method used to remove the coating shall not damage the pipe in any way.

Identification:

The exterior surface of the coating shall be yellow and continuously imprinted with identification markings which shall include, but not be limited to, the following:

1. Specification, grade and schedule, or wall thickness of the pipe
2. Coating Contractor's name
3. Coating date
4. Any other markings required under the latest revision of the Federal Department of Transportation Regulations.
5. "Long Beach Gas And Oil Dept 562-570-2140" shall be continuously stenciled on pipe.

Service Tees:

Mueller Company:

No-Blo Valve ¾"Service Tee, Catalog No. H-17650 (for steel mains)
No-Blo Valve 2" Service Tee, Catalog No. H-17500 (for steel mains)

Save-A-Valve:

Mueller Company:

Save-A-Valve Drilling Nipple, Catalog No. H-17490

Line Stoppers:

Mueller Company:

Part# H-17255

Transition Fittings:

Schedule 40 steel x SDR-11, P.E. 2406, polyethylene, with epoxy coating on the steel section and the steel end beveled for welding. Approximately 24 inches long with a tamperproof, gas tight, mechanical seal, internally reinforced, at the mid point.

SIZE	PART NUMBER
¾"	Lyco-LT060S060Y-AT
1"	Lyco-LT070S070Y-AT
1-1/4"	Lyco-LT080S080Y-AT
2"	Lyco-LT0200S0200Y-AT
4"	Lyco-LT400S4002-AT
6"	Lyco-LT600S600Z

Insulator Coupling:

SIZE	PART NUMBER
1-3/4”	KEROTEST 72512601
2”	KEROTEST 72512627
3”	KEROTEST 72512643
4”	KEROTEST 72524713
6”	KEROTEST 72512700
8”	KEROTEST 72530322

Tape Wrap:

Polyguard 600 or 634, 35 mil thick, with Polyguard 600 primer

Coating for irregular shaped fittings:

Trenton #1 Wax-Tape and Wax-Tape primer

Pipe Inspection

The Contractor must notify LBGO 48 hours prior to commencing the cleaning and wrapping of pipe. A LBGO Inspector shall have free access to all materials and shall be free to inspect and observe all phases of the wrapping process, from the blasting of the pipe to the final banding of the pipe for shipment**.**

Wrapping Plant Location

The City reserves the right to disqualify any wrapping plant located at a distance greater than 75 miles from Long Beach Gas and Oil Department’s Base Facility, at 2400 E. Spring Street, Long Beach, California.

Quality Standard

Wherever in these Specifications a specific manufacturer, product, or process is mentioned, the intent is only to establish a standard of quality.

HANDLING AND STOCKPILING

Handling: The equipment used for handling shall not damage the pipe or its coating. When slings or hooks are used, these shall be designed and/or padded so as to prevent deformation of the pipe and its welding bevels.

Distributing Pipe and Materials:

The Contractor shall be required to unload the pipe and distribute it along the route of the pipeline. Care must be taken not to obstruct the roadways any more than is necessary, to lay the pipe well off the traveled roadway where it will not be a menace to traffic, to leave all private and public driveways, alleys, streets, etc., open and handle the pipe in a careful manner so that the pipe and pipe coating or wrapping will not be damaged

Stockpiling: - Bare and coated pipe may be stockpiled or nested. The pipe shall be supported clear of the ground. The supports may be sand berms, wooden blocks, concrete piers or similar devices, designed to prevent deformation of the pipe or coating. Coating which is damaged due to stockpiling, handling, or any other cause, shall be repaired as described hereinafter. Stockpile failure shall be prevented by adequate blocking.

INSTALLATION

Steel Pipe and Fitting Installation:

The Contractor shall fabricate and connect all pipe, pipe assemblies and fittings necessary to make the complete installation.

Field connections of the steel pipe made by the shielded metal arc process shall use E60105P, or approved equal, welding rod for root passes and E60105P, or 5P+, or E7018 for the remainder. All welds made on to live or charged gas lines shall be welded with low hydrogen electrodes, for example E7018. Cellulous electrodes **are not** to be used, for example E6010. 1/8-inch welding rod must be used for stringer beads and hot passes; 5/32-inch shall be used on the other passes. The welding must be performed by qualified welders familiar with this type of work using the best welding practice. Pipe cutting shall be performed with a machine tool or an oxyacetylene torch. Care shall be taken to avoid burning the coating during the welding operation. In no case shall any spacing between pipe ends be greater than 1/8-inch and the welding must be performed in a manner that will leave no internal hollow spots or internal undercut. The finished weld must be equal to or greater in strength than the parent metal and of good structure acceptable for testing. Prior to welding, the pipe shall be thoroughly swabbed out, brushed or ground to clean metal at the discretion of the Inspector, and carefully aligned.

All tools and equipment used in the welding operations shall be in first class operating condition.

Suitable wind guards, welder's platforms or bellholes shall be provided when conditions warrant their use.

Beveling shall be performed with a machine tool or oxyacetylene beveling machine. All field cuts shall be normal to the axis of the pipe. Miter welds shall be prohibited. No sharp bevels shall be permitted. All pipe ends must have a land of approximately 3/32-inch before fitting for welding.

All oxides and foreign matter shall be removed prior to welding. The surfaces shall be smooth, uniform and free from fins or burrs which might adversely affect the welding operation.

The maximum offset or misalignment of the abutting pipe ends shall not exceed 1/32-inch. If the pipe ends are damaged or dented beyond these acceptable limits they shall be cut and rebeveled. Heating and straightening is prohibited.

The pipe joints to be welded in the field shall be supported to provide a minimum of 16" working clearance around the pipes.

Line-up clamps shall be used in all cases where pipe ends are to be joined with field welding operations.

Stringer beads shall be deposited so as to completely fuse the abutting pipe ends. There shall be complete penetration with a minimum inside reinforcement of 1/16-inch and maximum of 1/8-inch. The pipe shall not be moved during deposition of a stringer bead. Stringer bead welders shall not repair any "windows."

Each filler pass shall be completed before the next pass is started, except that a "stripper" may be used to build up low areas. The start of filler passes shall be staggered with complete overlapping of the previous bead.

All slag, knots of filler metal, and surface defects shall be removed between passes. Cleaning may be done by either hand or power tools. Flame gouging shall be prohibited.

Welds shall be built up at all points to a thickness of one and one quarter (1¼) times the wall thickness of the pipe.

Whenever work is left unattended, open ends of pipe shall be closed by plugs or by tying sacks securely over the ends or by other acceptable means. The ends of pipe shall be thoroughly cleaned of all rust, scale or foreign matter, which would affect the quality of welds.

Bends:

Minor differences in elevation of the surface of the ground and in alignment shall be cared for by smooth bends in the pipe, and care shall be taken to avoid all buckling or weakening of the pipe. No fire or wrinkled bends shall be allowed. Any pipe that is buckled by the bending operation shall be cut out and replaced at the expense of the Contractor.

For any given bend, the curvature shall be distributed uniformly throughout as great a length of the line as possible.

All smooth bends for pipe are to be made by the Contractor with the use of a bending machine of proper size and design. No stretching or thinning of the pipe wall thickness or injury to the coating will be permitted. All bends are to be subject to the approval of the Inspector.

Where existing substructures cannot be avoided by the use of smooth bends the Contractor shall make the necessary elevation changes or offsets using 45-degree butt weld elbows. The LBGO Inspector shall be consulted to determine whether to route the new pipe over, under or around any obstruction. A minimum separation of 12 inches shall be maintained between the new pipe and any other substructure unless the Inspector waives this requirement due to unusual circumstances which render it impractical.

Inspection and Testing of Field Welds:

Non-destructive testing (X-Ray) may be made randomly on pipe girth welds. Non-destructive weld testing will be performed by LBGO as directed by the LBE inspector.

Welds which are found to be unsatisfactory shall be cut out and repairs made at no cost to LBGO. The Contractor shall also reimburse LBGO for all costs associated with non-destructive testing of welds which are found to be unsatisfactory and retesting of repair/replacement weld(s).

LBGO may order the Contractor to cut out a section of pipe at a joint from which test specimens will be cut. A new section shall then be welded into the line to replace the section removed.

Samples will be tested to destruction by pulling or bending. Welds shall show a unit ultimate tensile strength of not less than the minimum tensile strength of the pipe metal. If fractured in bending, the weld shall show a uniform homogeneous structure free from porosity or slag and oxide inclusions. Welds shall show a 98% penetration and thorough fusion with the pipe metal.

Where welds have passed a satisfactory test, LBGO will bear the reasonable cost of cutting out the sample and repairing the pipe. If the welds fail to pass a

satisfactory test, the Contractor shall bear all costs in connection with the test and repairing of the pipe.

Where field welds have been cut out for testing purposes or for failing a non-destructive test, the Contractor shall make repairs by bringing the two ends of the pipe section together or by placing a short section of pipe in the gap and welding the ends.

Pipe Placing and Field Wrapping:

The coating of all pipe and fittings must be tested by the Contractor, in the presence of the Inspector, using a holiday detector or any other device or process which the inspector may select. Any pipe coating damaged by the Contractor in handling which does not pass the test, and any field wrapping which does not pass the test, shall be replaced by the Contractor at his expense.

After final inspection of the welds has been made the Contractor shall wrap the field joints using shrink sleeves or tape wrap. The sleeves or wrap shall be well lapped and bonded to the pipe coating in such a manner as to insure continuous and uniform protection over the entire pipeline. Valves and other irregular shaped pipe fittings shall be coated carefully with Trenton #1 Wax-Tape. The coating shall be well bonded to the fittings using Trenton Wax-Tape Primer and shall be lapped in such a manner as to provide continuous protection.

Pipe installed in open trenches shall be carefully lowered to final grade by hand or by using belt slings. Pipelines, as finally constructed, shall conform to the profile of the excavation at all points and the pipe shall be free from excessive strains after backfilling is complete.

Valve Installation:

Valves shall be carefully lowered into the trench using suitable equipment. Valves shall be inspected for defects prior to lowering into trench. Under no circumstances shall valves be dropped or dumped into the trench.

Steel valves shall be coated using Trenton Wax-Tape Primer and Trenton #1 Wax-Tape.

Valve boxes and covers shall be installed in accordance with the standard drawings in Attachment A of Specifications G-228A. Valve boxes shall be installed even with the surrounding pavement with a $\pm$ ¼" tolerance. The sand bedding shall be carefully and completely packed tightly under and around the valve boxes, redwood supports and support plates to preclude any possibility of settlement or movement of the lower section of the valve boxes. No part of the valve box or supports shall be allowed to come into contact with the valve or the pipe.

Placing and Field Wrapping of Buried Pipe:

After final inspection of the welds has been made the Contractor shall wrap the fittings and the field joints using shrink sleeves or tape wrap. The sleeves or wrap shall be well lapped and bonded to the pipe and the coating in such a manner as to insure continuous and uniform protection over the entire pipeline. Irregular shaped pipe fittings shall be coated carefully with Trenton #1 Wax-Tape. The coating shall be well bonded to the fittings using Trenton Wax-Tape Primer and shall be lapped in such a manner as to provide continuous protection.

The coating integrity of all pipe and fittings must be tested by the Contractor using a holiday detector or any other device or process which the Inspector may select. Any pipe coating damaged by the Contractor in handling which does not pass the test, and any field wrapping which does not pass the test, shall be replaced by the Contractor at his expense.

Pipe installed in open trenches shall be carefully lowered to final grade by hand or by using belt slings. Pipelines, as finally constructed, shall conform to the profile of the excavation at all points and the pipe shall be free from excessive strains after backfilling is complete.

The pipe coating shall extend approximately 24 inches above grade where the pipe emerges from the ground and the end of the coating shall be thoroughly sealed to the pipe to prevent any possibility of moisture intrusion between the pipe and the coating.

TEST OF WELDERS:

All welders shall be qualified under API 1104, Section 3.

No person shall be employed making welded joints on steel pipes unless that person has successfully complied with the requirements of the Code of Federal Regulations, Title 49, Part 192.227, “Qualification of Welders”.

Welder and welding operator qualification testing determines the ability of those tested to produce acceptably sound welds with processes and procedures to be used under field conditions.

Long Beach Gas & Oil personnel will administer the necessary qualifying test, which will consist of butt welding together two sections of twelve-inch (12") diameter Schedule 40 steel pipe in a horizontal fixed position (without a backing strip) using the qualified electric arc welding procedure No. A-1 furnished by LBGO. Root pass to be made with E6010 and remainder to be made with E6010 or E7018. The resulting weld will be examined and tested in accordance with Section I of Appendix C to Part 192.227.

If the Contractor intends to perform oxyacetylene welding on the project, Long Beach Gas and Oil Department personnel will administer the necessary qualifying test in the same manner as described for the electric arc welding test except that the

qualified procedure to be used shall be No. G-1 for the butt joint which shall be made by butt welding together two sections of two-inch (2") diameter Schedule 40 steel pipe in a horizontal fixed position.

Pipe and fittings for the tests will be furnished by LBGO. All other equipment such as welding machines and all welding materials and supplies must be provided by the Contractor at his expense.

In scheduling the qualifying tests the Contractor must allow for a period of 3 working days after the tests are administered before the test results will be available.

Full payment for successfully qualifying personnel to perform steel pipe welding, except for materials identified as being furnished by LBGO and costs associated with testing the completed welds, (except as otherwise noted), shall be included in the price bid for the work.